THE ROCKY MOUNTAIN LOCUST.

(*Caloptenus spretus* Uhler.)

By PROF. F. H. SNOW.

Now that this scourge of vegetation has taken its departure, I desire to put upon record a few observations of the past two months.

Upon the sixth of April I discovered the first young locusts, upon the southern slope of Mount Oread, just beyond the limits of the city of Lawrence (latitude 38° 58′; longitude 95° 16′.) This elevation is the termination of the high prairie, forming one of the bluffs at the intersection of the valleys of the Kansas and Wakarusa rivers. When first observed, the young locusts in myriads were at rest upon the ground, some of them, however, feeding upon the leaves of the Indian Plantain (*Cacalia tuberosa*). They were very diminutive in size, and when disturbed by my walking among them, would hop only two or three inches high, looking very much like the grains of sand in rapid motion upon a vibrating acoustic plate. The hatching took place, I soon learned, not only on the slopes of the bluffs, but also in many spots in the "bottom" land, along roadsides and in fields of grass and grain. It was two weeks after the first hatching of the Mount Oread colony that Mr. W. Osburn caught one hundred and ninety individuals at one sweep of the hand.

Not until about the tenth of May did the young locusts begin to move from their hatching grounds and cause serious apprehension among the farmers for the safety of their crops. At this time combined and systematic effort in neighborhoods infested would have prevented a large portion of the destruction which ensued. By the twentieth of May it became evident that the various colonies of locusts would consume everything in the line of their march, and that their ravages would only be arrested by their departure upon gaining their wings. Even at this late day, however, many were able to save portions of their crops by the ditching process. By this method three determined farmers uniting their efforts, destroyed three hundred and twenty bushels of locusts by actual measurement in ten days' time. On the twenty-fifth of May the destroying armies were entering the city of Lawrence in all directions, and soon the desolation of gardens was almost complete. In two days beautiful lawns of blue-grass were transformed into desert spots, as if they had been subjected to the burning heats of a long and rainless summer. The leaves upon the trees, however, did not share the general destruction, as the wingless gluttons could easily be kept from ascending. One citizen, by persistent combat, successfully defended his beautiful grounds, destroying in six days some seventy bushels of locusts. About one-sixth of the city, between the principal (paved) business street and the river, was not reached by the invading hordes, as was the case with occasional farms in the surrounding country.

In order to obtain a more correct idea of the immense numbers of the locusts, on the first of June I caught upon my own premises, in a common butterfly-net, one-half bushel in one-half hour. One quart of these contained, by actual count, 4,000 individuals, or at the rate of 128,000 to the bushel. Five days later, June sixth, they had nearly doubled in size, as one quart contained only 2,100 specimens, these being full grown pupæ, just ready to pass into the "imago" form.

The first winged locust was seen on May thirtieth, its final transformation having been carefully watched in the University building. This gives a period of fifty-five days from the first appearance of the larva to the first observed "imago." The

winged locusts were first seen to rise, for final departure, on the third of June. By the twelfth of June, just two weeks from the time the last moult commenced, very few remained in the pupa condition. To-day, June fourteenth, nearly all have taken their flight from my garden, a few stragglers only remaining behind, generally unable to fly on account of imperfect wings.

The direction of their flight I have carefully noted. When the wind is strong they fly with the wind. If the wind is light they fly towards the northwest, by what appears to be a natural instinct. Thus on June seventh, with a southwest wind, moving, according to the University anemometer, at the rate of three miles an hour, the locusts were flying in vast numbers in a direction a little to the north of west, *nearly in the face of the wind.* On June twelfth, also, with a northeast wind blowing at the rate of four miles an hour, they were flying in greater numbers than ever before in a northwest course, *at right angles to the direction of the wind.* It is therefore my belief that the natural instinct of the winged locusts of the spring hatching is to move towards the northwest, and though they may be temporarily delayed by contrary gales, that they will sooner or later, with ranks decimated by weakened constitutions and by the ravages of birds and parasites, arrive at their natural home in the mountains. It is even possible that none may live to reach the original home of the species. I do not consider the Eastern States to be in any danger from a locust invasion. I have observed hundreds of winged locusts fall to the ground during flight, either already dead or soon dying. These, upon examination, have generally proved to contain no parasites, and I judge that their death was in consequence of impaired strength, this second generation raised in an unnatural climate not equalling in vitality the first generation and succumbing to the fatigue consequent upon extended flight.

In regard to the natural enemies of the locust, I have observed a little external red parasite under the rudimentary wings of the pupa, and sometimes upon the body and secondary wings of the imago. These are mites, of the same class of insects as the spiders, and are not *eggs* as some have supposed. They occur in numbers from one to a dozen upon a single locust, and suck the life-fluid from its body, Placing about one quart of the locusts by themselves in a breeding cage, June fifth, I bred from them, within two weeks, some twenty specimens of parasitic flies belonging to three different species. One of these was the common Flesh-fly (*Sarcophaga carnaria*), and the other two were of the genus *Tachina*, the species not yet determined. I have also discovered several specimens of the Spined Soldier-bug (*Arma spinosa*), each with its jointed beak inserted in a locust of more than double its own size, and not leaving its victim until life was entirely extinguished. The large fly commonly termed the Bee-killer (*Asilus*), has been seen destroying the locusts in considerable numbers. Spiders have aided in the work of exterminating the pest. Finally, I am able to offer scientific proof that at least seven species of birds feed upon the locusts, having found them in the gizzards of the Red-headed Woodpecker (*Melanerpes erythrocephalus*), Yellow-billed Cuckoo (*Coccyzus Americanus*), Cat-bird (*Mimus Carolinensis*), Red-eyed Vireo (*Vireo olivaceus*), Great-crested Flycatcher (*Myiarchus crinitus*), Crow Blackbird (*Quiscalus versicolor*), and Blue-bird (*Sialia sialis*).

The preceding account being based entirely upon personal observations of the writer at his own home, it must not be inferred that the ravages of the locusts have been equally severe in the whole State of Kansas. The destruction by these pests for the year 1875 has been confined to a narrow strip on the eastern border of the State. Kansas, as a whole, never had finer promise of bountiful crops than at the

present time, and a second planting will undoubtedly repair the damage in the desolated district. The departure of the locusts is taking place more than two weeks earlier than at the time of the first visitation, eight years ago.

LAWRENCE, KANSAS, June 20, 1875.

LARVA AND CHRYSALIS OF THE SAGE SPHINX.

Sphinx lugens Walker (*eremitoides* Strecker).

By PROF. F. H. SNOW, of the University of Kansas.

During the last days of September, 1873, large numbers of caterpillars not observed in former years, were found feeding upon the leaves of the two species of wild sage which grow abundantly in this region. Some of these being transferred to breeding cages, they in a few days entered the ground, and in May and June, 1874, I obtained from them the moth whose name appears at the head of this article. As the larva and chrysalis of this species have been hitherto unknown, I append the following descriptions:

LARVA: Length, 3½ inches; diameter of central segments, .56 inch. Head greenish brown with a conspicuous white stripe on each lateral margin of the front, separating it from the brownish black sides of the head. The first three segments are of a light smoky green, thickly sprinkled with minute white dots, and having a dorsal brownish-black longitudinal band which tapers to a point at the front of the second segment, and enlarges to half its former breadth upon the rear of the first segment, tapering again to a narrow white-centered line at the front of this segment. This dorsal band is bordered with white on each side and is not continued beyond the third segment. Color of the remaining segments (except the last which is smoky brown with white dots), light green both above and below, with eight transverse rows of minute brownish-black, incomplete annuli upon each segment. Each of these segments has an oblique white lateral stripe extending from the anterior margin of the stigma to nearly the middle of the adjoining segment, becoming obsolete as it reaches the dorsal surface, except the seventh and last stripe, which remains distinct until it reaches the caudal horn. Each of these white stripes has an obscure blackish border on its upper margin. The white stripe is faintly indicated on the anal segment which is inferiorly margined with white. Caudal horn deep brownish black, .37 inch in length. Stigmata yellowish brown encircled with black, bounded inferiorly with an obscure white line. True legs of a smoky color with silvery spots on the inner surface; prop-legs deep smoky brown, lighter on the inside and with the clasping edges black.

Some of the larvæ have the smoky brown markings very obscurely indicated, the prevailing color being pale green.

FOOD PLANTS: *Salvia trichostemmoides* Pursh, and *Salvia Pitcheri* Torrey.

The larva becomes full grown from the first to the fifteenth of October, and forms its chrysalis in the ground at the depth of five to six inches.

CHRYSALIS: Length 2.30 inch; breadth 0.60 inch; color reddish brown, darker at the anal extremity, upon the upper surface and around the stigmata; an olive tinge upon the breast. The tongue case is 1.12 inch long from the end of the loop to the